22 Nov 05 OSD TLCSM Memo Containing PBL Performance Metrics

- Operational Availability
- Mission Reliability
- Logistics Response Time
- Total Life Cycle Cost per Unit of Usage
- Cost per Unit Usage
- Logistics Footprint

Operational Availability (Ao)

- Memo definition: The percent of time that a weapon system is available to sustain operations

- PBL Guidebook concept: Ao is a weapon system or system of systems readiness measurement indicator that explicitly considers the interactions of reliability, availability & maintainability in keeping weapon systems available to perform their missions

- PBL Guidebook definition: The percent of time that a weapon system or system of systems is mission capable

- Measures the degree to which equipment is in an operable state and can be committed at the start of a mission, when the mission is called for at a random point in time

Operational Availability Metrics

Ao = Up Time / Total Time = Up Time / (Up Time + Down Time)

In Memo: Ao = MTBM / (MTBM + MDT)

Prior to Fielding for Corrective Hardware (HW) Maintenance Ao:
Ao = MCTBF / (MCTBF + MTR + CWT)

- Army has Ao driven Readiness Based Sparing and Level of Repair Analysis models available for use by Govt & Contractors

✓ SESAME optimizes sparing to an Ao input or calculates Ao for the HW corrective maintenance portion if sparing mix is inputted

Operational Availability Metrics

Prior to Fielding for Periodic Maintenance/Actions Portion of Ao:

1 – (Periodic Action Down Time / Calendar Time Between Periodic Actions)

Ao = Corrective HW Maintenance Ao x Product of Ao's from each type of Periodic Action Causing System Down Time

- Modeled with Reliability and Logistics Chain metric inputs to evaluate Ao as a single performance metric. Inputs can be identified & computed in stakeholder segments of responsibility

- Note: Use of MTBF in Ao equation is wrong unless a system operates continuously. For unit consistency, all units are in calendar time, while MTBF is in operating

Mission Reliability

- Memo definition: The measure of a weapon system in meeting mission success objectives. Depending on the weapon system, a mission objective would be a sortie, tour, launch, destination reached, capability, etc.

- PBL Guidebook definition: The measure or ability of a system to achieve operational performance for a defined mission or specified mission profile

- Probability of performing a mission action without an operational mission failure within a specified mission duration timeframe

Mission Reliability Metrics

Discrete Missions:
Number of Successful Missions / Number of Missions Attempted

- Sortie Rate for Aircraft

Prior to Fielding:

- Mean Time Between Operational Mission Failure
- Mean Miles Between Failure causing operating degradation or loss

After Fielding if Operating Metrics Recorded:

- Mean Operating Hours Between Operational Mission Failure
- Mean Flight Hours Between Operational Mission Failure
- Mean Miles Between Operational Mission Failure

After Fielding if Operating Scenarios Not Recorded:

- Mean Calendar Time Between Failures causing operating

Operational Reliability

- Mean life units between critical failures

✓ MTBOMF – The average operating hours between the occurrence of an operational mission failure

✓ MTBF - The average operating hours between failures to all critical items in the weapon system that are serially configured

✓ MTBSA – Mean time or mileage between system aborts. (loss or degradation of essential functions causing a system to be unable to start or complete a mission or be withdrawn)

✓ MCTBF – The average calendar time between failures causing down time

Logistics Response Time

- Memo definition: The period of time from logistics demand signal sent to satisfaction of that logistics demand required for weapon system logistics support

- PBL Guidebook definition: The period of calendar time from when a failure/malfunction is detected and validated by the maintainer to the time that the failure/malfunction is resolved
  - ✓ Time from when need is identified until provider satisfies that need
  - ✓ All associated supply chain, maintenance time & delivery times of parts

- Measures the delivery times of parts to military customers for materiel requisitioned through the DoD logistics systems or other delivery means to a predetermined location

Logistics Response Time Metrics

Prior to Fielding:

- Mean Time to Restore when Spares Available at Forward Level
- Down Time(s) per Periodic Downtime Action(s)
- Customer Wait Time per Critical Failure outputted by SESAME

After Fielding:

- LRT = Σ(Receipt date – Requisition date) / Total Requisitions
- Support Activity's Stock Availability from Actual Demands
- Mean Down Time(s) per Periodic Downtime Action(s)
- Order & Ship Time to Customer (for Removal & Replacement)
- Repair Cycle Time (for Screening or Repair & Return Actions)

Cost Per Unit of Usage

- Memo definition: The variable operating costs divided by the appropriate unit of measurement for a given weapon system.

- PBL Guidebook concept: The objective is to collect all operating and support costs data and elements at the lowest level required to maintain and sustain a weapon system

- PBL Guidebook definition: The total operating and support costs, to include overhead and management costs, for a weapons system usage attributable to a given unit of usage. Usage can be measured in terms of unit density or individual weapon systems; usage factors include miles, rounds, launches, flight hours, time, systems, etc.

Cost Per Unit of Usage Metrics

After Fielding if Operating Metrics Recorded:

- Total Operating and Support Cost per Mile, Round, Launch, Flight Hour or Operating Hour
  - ✓Operating costs
  - ✓Maintenance costs (AMDF price spent on items repaired - repair credits)
  - ✓Spare & Repair Parts cost (AMDF price from items replenished)
  - ✓Facilities cost (Military Construction funding)

After Fielding if Operating Metrics Not Recorded:

- Total Operating & Support Cost per System Fielded per Year
- Annual Operating & Support Cost for Quantity of Systems Impacted

Potential Improvements to Existing Baseline:

- Return on Investment* for Improvement vs. Status Quo

* (Discounted Remaining LCC Savings for Quantity

Total Life Cycle Cost Per Unit of Usage

- Memo definition: The total operating and life cycle costs divided by the appropriate unit of measurement for a given weapon system.

- PBL guidebook lacks definition, but does contain some Life Cycle Cost (LCC) metric factors

- Total remaining LCC for weapon systems being acquired prior to fielding. Total non sunk costs remaining over the systems life based on its projected usage rate.
  - ✓ Should be used in Level 2 Business Case Analysis with supportability analysis optimization in the LCC estimate
  - ✓ Useful for new weapon system Baseline Cost

Total Life Cycle Cost Per Unit of Usage

Prior to Fielding for Acquisitions:

- Non-Sunk, Life Cycle Cost Estimate for Acquisition Quantity
  - ✓Non-Logistics costs remaining associated to systems development, production, test, PM and systems engineering support)
  - ✓Initial Deployment costs (fielding + NET, simulators & training material + facilities/site activations + mil construction impacted by system quantity)
  - ✓Recurring Operating costs (operators + energy (batteries & POL) + recurring training + scheduled maintenance + IMMC support + post production PM & systems engineering + PP SW support + HW changes)
  - ✓Support Costs influenced by RAM (warranty + organic repair + CLS + initial provisioning + inventory holding + replenishments + transportation + support/test equipment + repair documentation)
  - ✓Disposal cost (equipment demilitarization & disposal)

Logistics Footprint

- Memo definition: The government/contractor size or presence of logistics support required to deploy, sustain, and move a weapon system. Measurable elements include:
  - ✓ Inventory/equipment
  - ✓ Personnel
  - ✓ Facilities
  - ✓ Transportation assets
  - ✓ Real estate

- PBL Guidebook definition: Same as memo and includes: measures should quantify the footprint, i.e. weight, area, volume, and personnel, etc. as appropriate

Logistics Footprint Metrics

Prior to Fielding :

- Total Weight or Transport Dimensions of Deployable Systems, Retail Inventory, Energy and/or Test Equipment
- Number of Operators per System
- Maintenance Ratio
- Energy Requirements (miles per gallon or kilowatts per hour)
- Component Commonality (Existing NSNs / Total NSNs)

Deployment to Area of Operations:

- Time to Transport Unit’s Personnel & Equipment Impacted
- Area and/or Time to Set Up Needed Facilities if Not in Place

Sustainment in Area of Operations:

- Total Number of Personnel in the Deployed Area Required to Transport and Sustain the Weapon System
- Component Demand Rates & No Evidence of Failure Rates

Total Life Cycle System Management